



U.S. Department of Energy Energy Efficiency and Renewable Energy

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INDUSTRIAL TECHNOLOGIES PROGRAM

Improving Chilled Water System Performance Chilled Water System Analysis Tool (CWSAT) Improves Efficiency

- *Is your chilled water system operating efficiently?*
- *Are you thinking of implementing changes to your chilled water system?*
- *What cost savings can you expect from implementing various energy conservation measures?*

The U.S. Department of Energy's Chilled Water System Analysis Tool (CWSAT) is a software tool that is available at no charge to help optimize the performance of industrial chilled water systems. The tool allows the user to propose changes to existing equipment (including chillers, pumps, and towers), and calculates how much energy and money

the plant can save by implementing these changes.

The CWSAT uses inputs of the chilled water system equipment and operating parameters to calculate the system's energy consumption. The level of input detail is customized to the knowledge of the user. When specific equipment details are not known, catalog and default data are present within the CWSAT and can be readily utilized. The CWSAT allows users to analyze the impacts of implementing many system improvement measures by changing input data and comparing the revised system's energy consumption to the user's originally inputted system. The tool can



With CWSAT, users can:

- **Determine energy consumption and costs of operating the chillers, pumps, and towers in a chilled water system**
- **Examine the energy (and economic) impact of varying operating scenarios**
- **Quantify potential cost and energy savings**

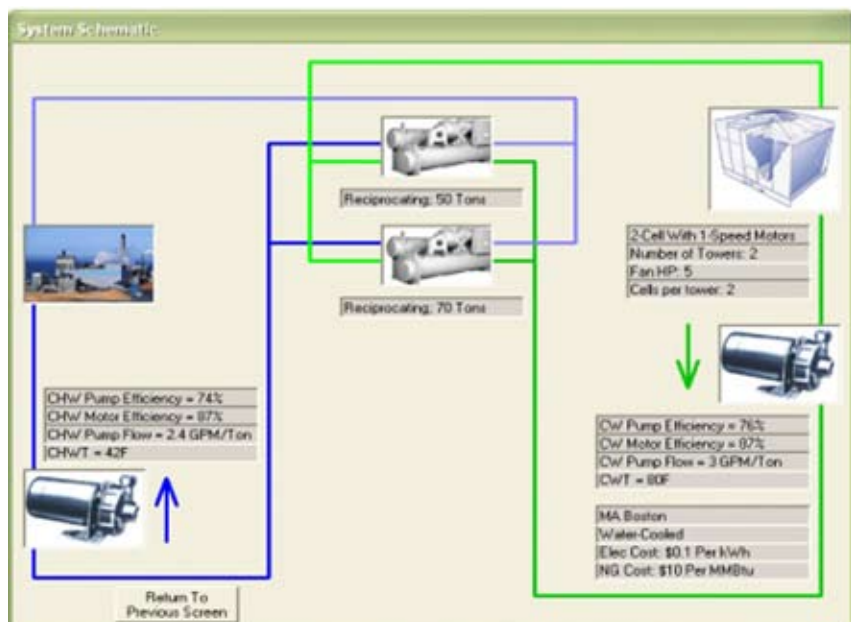


Figure 1: Sample system schematic showing chilled water system specifications

To download the Chilled Water System Analysis Tool (CWSAT) and other free software tools or participate in an on-line tool forum, visit us at:

www.eere.energy.gov/industry/bestpractices/software.html

To learn more, contact the EERE Information Center (1-877-337-3463) or visit the BestPractices web site at www.eere.energy.gov/industry/bestpractices

quickly calculate the potential energy savings opportunities that exist from measures such as increasing the chilled water temperature, decreasing the condenser water temperature, replacing the chillers, applying variable speed control to the circulation pump motors, and upgrading the tower motor controls to 2-speed or variable speed. Depending on the characteristics of the specific chilled water system being analyzed, the tool can examine additional system specific cost reduction measures. These measures include replacing the chiller refrigerant, installing a variable speed drive on centrifugal compressors, using free cooling, and sequencing chiller operation to minimize energy consumption.

Tool Description

The CWSAT estimates the energy and cost savings potential associated with chilled water system equipment and operational changes. The tool can model a variety of system configurations including:

- air-cooled and water-cooled systems
- systems with multiple unequally sized and/or different chiller types operating together
- variable flow systems

In addition, flexible scheduling enable users to custom define system operation. Users receive detailed, quantitative assessments that will help them enhance the performance of their chilled water systems. The CWSAT provides energy and cost comparisons of current and proposed systems in easy-to-understand graphs and tables. Outputs from the tool include:

- Bar graphs comparing energy consumption and operational costs of current and proposed chillers, pumps, and towers
- Savings summary table
- Energy consumption values of chillers, pumps, and towers under various conditions.



Figure 2: A sample "before and after" graph of a chilled water system's energy consumption and costs. (Note: In this example, the effects of decrease condenser water temperature are being analyzed.)

CWSAT was created at the University of Massachusetts-Amherst supported by the U.S. Department of Energy.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

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